

REMARKS

Claims 1 and 3-8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over DE 311397 in view of Injeski, Jr. (US 2,702,123) and Weatherby (US 1,218,916), and claim 2 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over DE 311397 in view of Injeski, Jr., Weatherby, and Soley (US 4,055,489). Applicant respectfully traverses these rejections as being based upon combinations of prior art references that neither teach nor suggest the novel combination of features recited in independent claim 1, and hence dependent claims 2-8.

The Office Action admits that “DE ‘387 as set forth above thus teaches all that is claimed expect for expressly teaching said second conveyor parallel to said first conveyor.” Thus, the Office Action relies upon Injeski, Jr. and Weatherby for “both demonstrating that the position of adjacent conveyors in parallel is well-known and a mere design choice dependent on the type of material being conveyed or the desired conveying speed.” As a result, the Office Action alleges that it would have been obvious to “modify the invention of DE ‘387 with parallel adjacent conveyors as the positioning of conveyors is a mere design choice.” Applicant respectfully disagrees.

Applicant respectfully asserts that combining the teachings of Injeski, Jr. and/or Weatherby with DE 311387 changes the principle of operation of DE 311387, thereby rendering the invention of DE 311387 unsatisfactory for its intended purpose. Applicant respectfully submits concurrently herewith an English-language translation of DE 311387 to evidence the explicit disclosure of DE 311387. For example, as taught at paragraph 7, page 2 of the English-language translation, DE 311387 teaches that:

“[d]ue to belt *f* gradually getting closer to belt *a*, the more

strongly magnetizable particles are already attracted at a greater distance than more weakly magnetizable particles. The separation material is not therefore attracted all at once by the poles, in which case low-grade particles would only be separated off to a very minor extent.”

Furthermore, DE 311387 concludes with claims reciting that:

“2. Dry separator according to Claim 1, characterized in that the distance of the special feeding belt from the pole faces and the separating conveyor belt gradually becomes smaller and this intensifies the effect of the magnet poles on the transported crude ore.”

Accordingly, Applicant respectfully asserts that the belt *f*, in FIG. 1 of DE 311387, is specifically positioned along an incline with respect to belt *a* to provide that “[t]he separation material is not therefore attracted all at once by the poles, in which case low-grade particles would only be separated off to a very minor extent.” Thus, Applicant asserts that modifying DE 311387 with the teachings of Injeski, Jr. and/or Weatherby would render DE 311387 unsatisfactory for its intended purpose, and would change the principle operation of DE 311387.

As MPEP 2143.01 instructs, “[I]f proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).” Accordingly, modifying DE 311387 with the teachings of Injeski, Jr. and/or Weatherby would cause DE 311387 to fail to function such that “the more strongly magnetizable particles are already attracted at a greater distance than more weakly magnetizable particles,” and “the separation material is not therefore attracted all at once by the poles, in which case low-

grade particles would only be separated off to a very minor extent.” Thus, Applicant respectfully asserts that combining the teachings of Injeski, Jr. and/or Weatherby would render DE 311387 unsatisfactory for its intended purpose.

Furthermore, MPEP 2143.01 instructs, “[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).” Accordingly, Applicant further asserts that combining the teachings of Injeski, Jr. and/or Weatherby would change the principle of operation of DE 311387 since placing belt *f*, in FIG. 1 of DE 311387, in parallel to belt *a* would not result in a condition where “the more strongly magnetizable particles are already attracted at a greater distance than more weakly magnetizable particles,” and “[t]he separation material is not therefore attracted all at once by the poles, in which case low-grade particles would only be separated off to a very minor extent,” as required by DE 311387. Furthermore, Applicant respectfully asserts that none of the prior art of record provides proper motivation to change the principle of operation of DE 311387.

Therefore, Applicant respectfully asserts that the Office Action has not established any proper motivation to modify DE 311387, and thus not established a *prima facie* case of obviousness with respect to independent claim 1, and hence dependent claims 2-8.

Applicants further assert that the Office Action does not rely on Soley to remedy the deficiencies of DE 311387, Injeski, Jr. and/or Weatherby. Moreover, Applicants respectfully assert that Soley cannot remedy the deficiencies of DE 311387, Injeski, Jr. and/or Weatherby.

For the above reasons, Applicant respectfully asserts that the rejections under 35 U.S.C. § 103(a) should be withdrawn because none of the applied prior art references, whether taken individually or in combination, teach or suggest the novel combination of features clearly recited in independent claim 1, and hence dependent claims 2-8.

CONCLUSION

In view of the foregoing, Applicant respectfully requests reconsideration and the timely allowance of the pending claims. As requested above, should the Examiner feel that there are any issues outstanding after consideration of the response, the Examiner is invited to contact the Applicant's undersigned representative to expedite prosecution.

If there are any other fees due in connection with the re-filing of this response, please charge the fees to our Deposit Account No. 50-0310. If a fee is required for an extension of time under 37 C.F.R. § 1.136 not accounted for above, such an extension is requested and the fee should also be charged to our Deposit Account.

Respectfully submitted,

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PATENT

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DONNERSMARCK PLANT
UPPER SILESIAN IRON AND COAL WORKS AG
in HINDENBURG, UPPER SILESLA

Magnetic Dry Separator

Patented in the German Empire as of November 28, 1916

The object of this invention is a dry magnetic separator that differs essentially and advantageously from all known devices in that it allows the achievement of very effective conveyance, thorough workability and enrichment of the separation material.

Iron ores in which the low-grade and high-grade content consist of very small particles must, as is known, be crushed very finely for magnetic enrichment. This crushing must not, however, exceed a certain limit when known magnetic separators are used because otherwise there would be less enrichment and separation would ultimately stop altogether. The limits to be observed depend on the way the separator works and its construction.

This new separator is able to economically separate an iron ore where the known designs would have to fail due to the required fineness of the crushing. This purpose is achieved by the conveyor belt equipped with carrier bars made of non-magnetic material and the separation material attached to it going past the pole faces of alternatingly polarizable magnets. This gives the advantageous effect mentioned above. Furthermore, the distance of the particular feeding conveyor from the pole faces and from the separating conveyor belt gradually becomes smaller and the effect of the magnetic poles on the transported crude ore gradually becomes stronger.

Although magnetic fields whose strength increases gradually or incrementally in the through-pass direction of the separation material are admittedly described in many forms of embodiment, the latter are characterized in that the means of conveyance runs through the wedge-shaped gap formed by two opposed poles.

The drawing shows the object of the invention in an embodiment example, i.e.,

Figure 1 shows an axial section according to line A-A of Figure 1, and

Figure 2 shows a cross-section according to B-B of Figure 1.

Inside transport belt *a* there is a fixed magnet system *b* whose north and south poles alternate in the direction of the movement of the belt and produce fields of the width of the belt. The pole faces are turned downward and lie right over the lower length of the belt, separated from it by a thin plate *c* of magnetically unexcitable material to prevent direct contact.

The pole faces form a flat plane but can also form a bowed surface, in order, for example, to achieve a better fit to the belt. The transport belt is equipped with carrier bars *d* which lie parallel to the surface lines of running drum *e*. The feeding of the separation material occurs via transport belt *f* of such a type that its upper length gradually gets closer from below to the lower length of the belt *a* and the magnetic field.

The working cycle is as follows:

From the ore that arrives in a thin layer on belt *f*, the magnetizable particles are drawn by the magnet poles lying above them up against belt *a*, i.e., little by little depending on their degree of attraction. Readily separable, purely low-grade coarser particles remain on belt *f* and are transported directly into collecting bin *h*. The dust-like or powdery low-grade parts adhering to the ore particles are also drawn onto belt *a* and have to be separated out only in the course of the further working cycle.

The separation material attached to the belt is subjected to vigorous working on its way along the pole faces. This working is produced by the separation material being firmly drawn in a dense layer on the stretches of the belt that bridge the space between two neighboring poles. From now on the material would remain in the same place and belt *a* would slide through without a significant conveying action between the clinging layer of ore and the pole face if the non-magnetic carrier bars *d* were not present. The latter cause the separation material to be entrained in the direction of the movement of belt *a* against the restraining effect of the magnetic forces occurring between two neighboring poles. The non-magnetizable carrier bar is not drawn against the pole faces and this saves considerable work consumed by friction and abrasion caused thereby.

If the separation material again passes under a pole from now on, there is a whirling up and dispersion downward of the previously firmly attracted layer of ore and the individual ore particles, under the influence of weight and the forces acting primarily vertically to the pole faces, make the most vigorous free movement through the air. This causes much low-grade material to fall out. The non-magnetizable carrier bars also play an important role in this in that they magnify the movements in a striking manner when passing the poles by removing the ore particles from the poles. Thus, for example, under a pole approx. 90 mm wide (in the direction the belt runs) a vortex approx. 40 mm high forms which increases to 60 to 70 mm at the passage of a carrier bar approx. 10 mm high and equally wide.

Due to belt *f* gradually getting closer to belt *a*, the more strongly magnetizable particles are already attracted at a greater distance than more weakly magnetizable particles. The separation material is not therefore attracted all at

once by the poles, in which case low-grade particles would only be separated off to a very minor extent.

The high-grade ore ore is finally conveyed to collection bin *g* while the low-grade ore is dumped into collection bin *k* from belt *f*.

Claims:

1. Magnetic dry separator, the conveyor belt of which takes the separation material attached to it past the pole faces of alternately polarized magnets, characterized in that the conveyor belt is equipped with carrier bars made of non-magnetizable material, for the purpose of achieving effective conveyance, thorough workability and further concentration of the separation material.
2. Dry separator according to Claim 1, characterized in that the distance of the special feeding belt from the pole faces and the separating conveyor belt gradually becomes smaller and this intensifies the effect of the magnet poles on the transported crude ore.



Zu der Patentschrift 311387

Fig. 1. Schnitt A-A

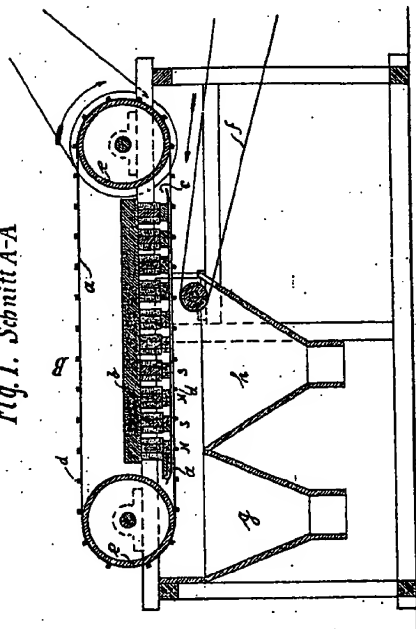


Fig. 2. Schnitt B-B

